77312

US005732044A

United States Patent [19]

Jarvis

[11] Patent Number: 5,732,044

[45] Date of Patent: Mar. 24, 1998

[54] **SYSTEM AND METHOD FOR COMPENSATING FOR DOPPLER SHIFTS IN SIGNALS BY DOWNSAMPLING**

[75] Inventor: **Susan M. Jarvis**, Dartmouth, Mass.

[73] Assignee: **The United States of America as represented by the Secretary of the Navy**, Washington, D.C.

[21] Appl. No.: **715,741**

[22] Filed: **Sep. 19, 1996**

[51] **Int. Cl.**[6] **H04B 11/00**

[52] **U.S. Cl.** **367/134**; 367/904

[58] **Field of Search** 367/134, 904

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,099,249	7/1978	Casasent	364/822
4,905,211	2/1990	Mackelburg et al.	367/134
5,130,952	7/1992	Fientuch et al.	367/904
5,388,080	2/1995	Fientuch et al.	367/135

Primary Examiner—Daniel T. Pihulic

Attorney, Agent, or Firm—Michael J. McGowan; William F. Eipert; Prithvi C. Lall

[57] **ABSTRACT**

A signal shift compensation system and method compensates for a shift in a signal, such as a Doppler shift in an acoustic signal. The system includes a signal sampler for oversampling the shifted signal at a fixed oversampling rate to establish an oversampled shifted signal digital value sequence. The fixed sampling rate is greater than the typical sampling rate, such as the Nyquist rate, of the signals by an oversampling factor. The system further includes a compensation downsampler for decimating the oversampled Doppler shifted signal according to a downsampling factor to establish a decimated digital value sequence. The downsampling factor is determined according to the oversampling factor by which the signal is oversampled and an estimate of the (Doppler) shift value. In one example, the downsampling factor is equal to the oversampling factor divided by a Doppler multiplier reflecting the Doppler shift. Each sample in the decimated sequence is given the value of a corresponding sample in the oversampled sequence. Decimation according to the downsampling factor results in a decimated sequence that closely approximates the original unshifted signal.

13 Claims, 5 Drawing Sheets